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Research & Strategic Partnerships: Quarterly Review, Volume 2, Issue 4

Portland State University. Research & Strategic Partnerships

Portland State UNIVERSITY

RESEARCH

RESEARCH & STRATEGIC PARTNERSHIPS

Quarterly Review, Volume II, Issue 4, 2015

Mapping Portland

PSU faculty create maps Portlanders can use to address urban issues facing the city

Using Big Data to Improve Cities

Computer scientist Kristin Tufte develops ways cities can use "big data" to address critical social and environmental issues.

Integrating Traffic Management and Air Quality

A study of one of Portland's busiest arterials could inform how city officials integrate public health into efforts to improve the transportation system.

Portland/PSU Partner on Smart Cities Initiative

PSU and the City of Portland will partner on smart city projects over the next year as part of a national MetroLab Network initiative.

Research & Strategic Partnerships
Quarterly Review, Volume II, Issue 4, 2015

Can our green, livable city also be smart?

Even before Portland State aspired to be one of the nation's leading metropolitan research universities, it attracted world-class faculty who wanted to live and work here. Portland continues to be the top draw for recruiting our faculty, students, and staff. But what is it about our city that makes it so appealing, and how are those factors changing today?

These questions not only motivate the demographics and economics of our campus and our region, they also provide ripe subjects for research, as this issue of Research and Strategic Partnerships' *Quarterly Review* illustrates.

Cities have long been topics of academic study, which PSU's urban planners, architects, and social scientists have taken advantage of. The results have been influential partnerships with municipal agencies, non-profits and local companies, jobs for our students, and major contributions to regional policy innovation.

But for natural scientists, engineers, and computer scientists, establishing funded research programs on urban systems has been more difficult, in part because no federal agencies "owned" the urban agenda, and because cities are too complex for any single discipline to unravel.

However, growing interest over the past decade in sustainability, particularly as it applies to cities, began to open that door. In 2009 PSU faculty capitalized on this opportunity by winning a $3M "Ecosystem Services for Urbanizing Regions" graduate training grant from the National Science Foundation, along with other environmentally themed STEM funding. More recently, PSU faculty members have been key players in major urban grants led by other universities, including a $12M NSF award on "Urban Resilience to Extremes" made to Arizona State University.

Portland's reputation as a leading "green" city centers on the integration of the natural environment into its urban fabric. It is also known as one of the most "livable" cities in the country, because of its strong neighborhoods, cultural amenities, public transportation, and attempts to address the persistent inequities found in all major population centers.

Over the past few years, a third label has joined "green" and "livable." "Smart" cities use distributed sensors, cloud computing, and advanced analytic techniques to improve the services delivered to their residents. The federal government and large corporations are beginning to put major resources into making cities smarter.

The profiles in this issue highlight the many ways PSU researchers are helping to make Portland and other cities greener, more livable, and smarter. Several of the projects, including ones dealing with the urban heat island, green infrastructure, the food economy, air quality, and transportation, are funded in part by the Portland Climate Action Collaborative, a path-breaking program through which PSU faculty and students work on problems prioritized by Portland's Bureau of Planning and Sustainability. The Seattle-based Bullitt Foundation and PSU's Institute for Sustainable Solutions jointly fund the Collaborative.

A few of the stories also describe how PSU faculty and graduate students are participating in a major national effort, led by the White House's Office of Science and Technology Policy, called the MetroLab Network, which brings together teams of urban universities and city agencies to speed the development and deployment of smart city projects. The diverse Portland team includes several city departments, as well as TriMet, Intel, the Technology Association of Oregon, CH2M Hill, and DK Associates, among others.

These urban projects, along with others described in this issue concerning a major grant to support the study of e-cigarettes, and a video technique for speeding up professional training, have several things in common. They are highly interdisciplinary, co-developed with off-campus partners, and comprised of teams that include faculty, post-docs, and graduate students. They have the common goal of making lessons we learn in Portland relevant to cities around the world.

While in the past, Portland was the reason many of us came to PSU, now PSU is returning the favor, becoming one of the main factors attracting individuals and organizations to move to Portland.

Jonathan Fink,
Vice President
Research & Strategic Partnerships

Cover: *Map of Portland with a LiDAR-derived canopy biomass metric; image courtesy of the Sustaining Urban Places Research (SUPR) Lab in the College of Urban and Public affairs.* **Inside Cover:** *Tilikum Crossing bridge.*

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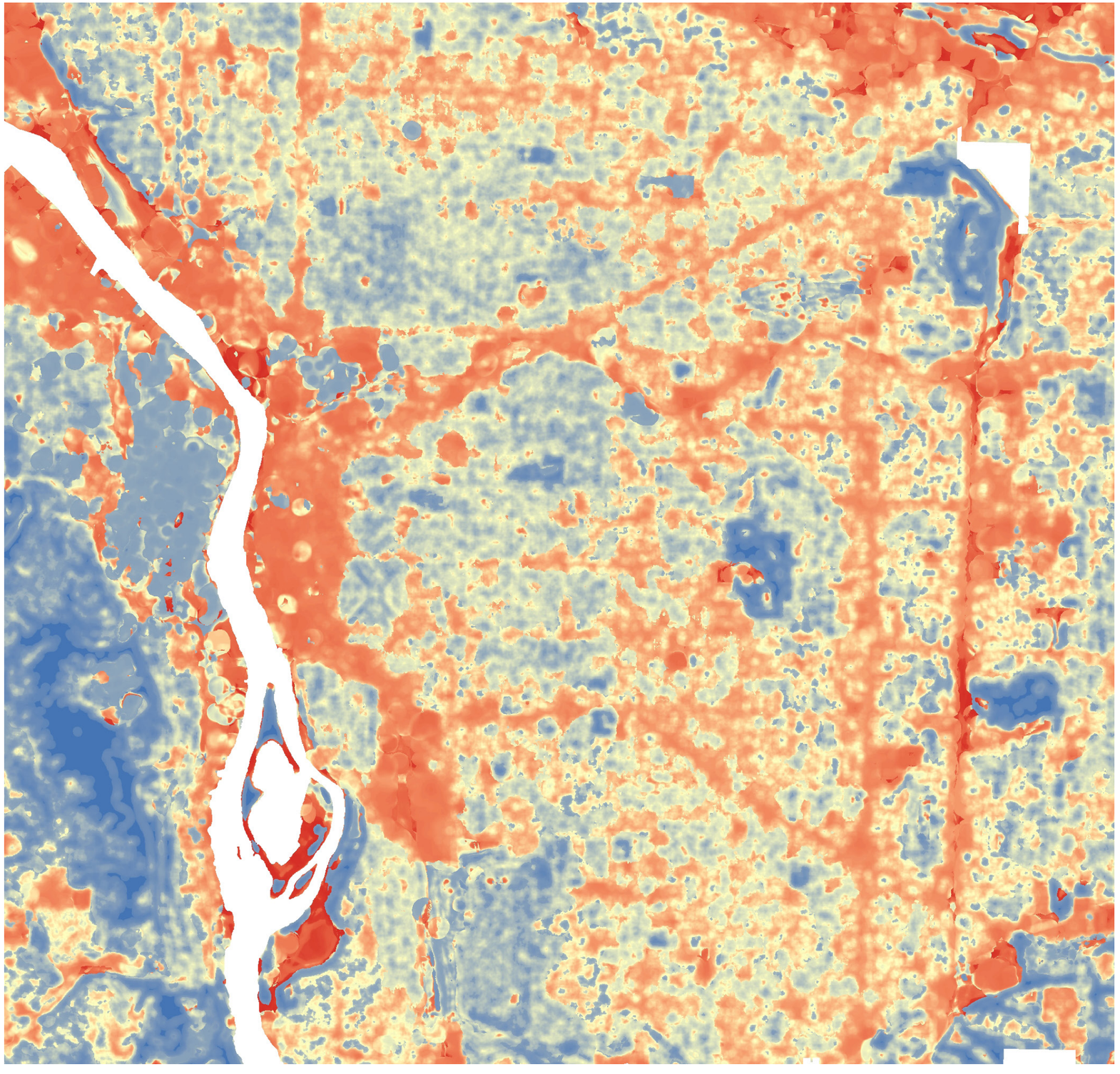
MAPPING PORTLAND TO IMPROVE CLIMATE RESILIENCY

By Shaun McGillis



"Out of the frying pan and into the fire."

That is how Portlanders might describe the nearly incessant stretch of above average temperatures this summer. June, July, and August were sweltering, bringing record-breaking heat waves and weeks without measurable precipitation. Unusual as the weather may have been, some climate models suggest this is the new norm.

As summers have been historically mild in the Pacific Northwest, the shift to warmer weather for longer periods of time could place the Rose City and its residents under considerable stress. High temperatures, particularly in areas referred to as "urban heat islands" pose serious health risks. The danger is compounded by the increased presence of respiratory irritants like smog and ozone that form when heat alters the chemistry of emissions from motor vehicles and industrial operations.

On days of extreme high temperatures, in neighborhoods where the heat island effect and poor air quality intersect, the health of vulnerable populations—older adults, very young children, the unhoused, those without access to services, and residents with cardiovascular or respiratory diseases—is in jeopardy. That means Portland, and cities like it all over the world, are facing the potential of a climate-change-induced public health crisis.

Into the fire indeed.

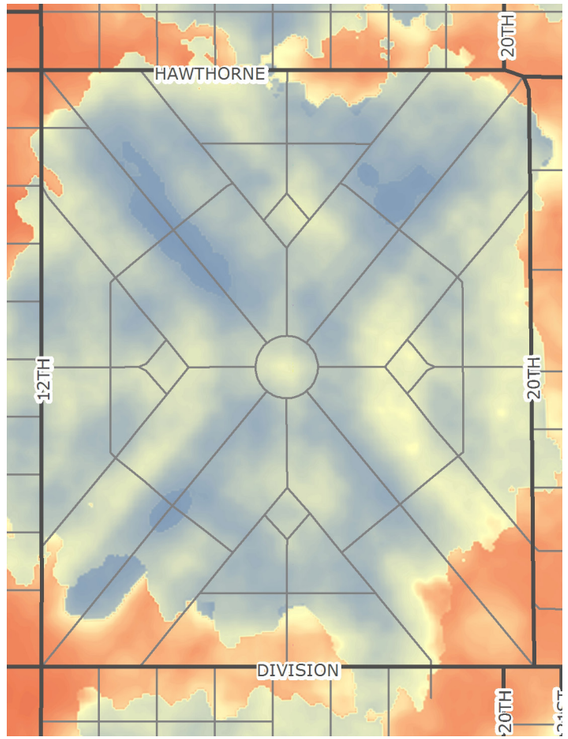
The likelihood of such a crisis, however, can be greatly reduced. The City of Portland, being on the leading edge of action to reduce carbon emissions and prepare for the effects of climate change, has a plan to transform the Rose City into one of the most climate resilient cities in the world.

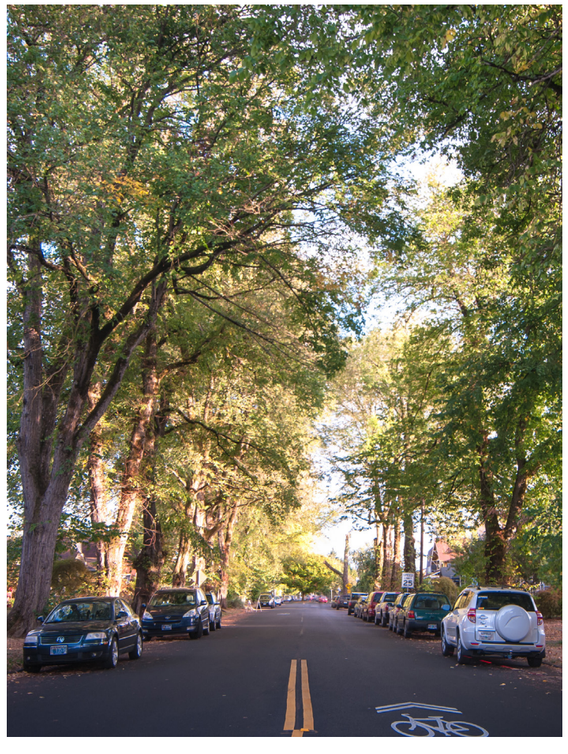
Portland's Climate Action Plan calls for reducing the heat island effect, minimizing health issues related to degraded air quality, and using data-driven, up-to-date maps "to help inform decisions and priorities about projects and programs that help cool the urban environment."

To complete these actions by a 2020 deadline, the city enlisted the expertise of PSU's Dr. Vivek Shandas and a handful of other talented PSU faculty with expert knowledge of disciplines related to sustainability science. Shandas's team includes Drs. Todd Rosenstiel (Biology), Linda George (Environmental Science and Management), and David Sailor (Mechanical and Materials Engineering). The PSU team works in collaboration with the city, state, NGOs, and community groups to assess human vulnerability to heat stress and air pollution within the city. Their project is funded by PSU's Institute for Sustainable Solutions (ISS) through a grant from the Bullitt Foundation and is a part of the **Portland Climate Action Collaborative**, a partnership between ISS and Portland's Bureau of Planning and Sustainability that focuses on research-driven solutions to urban sustainability problems.

"To prepare for the possible negative health impacts of extreme heat and air pollution, we have to know where heat islands are and

This Page: *Streching from downtown to east county, the differences in neighborhood temperatures are apparent and range upwards of 17ºF.*





air pollution is concentrated," said Dr. Shandas, Associate Professor of urban studies and planning. "We also need to know where our vulnerable residents are. Then when we layer all of that data on a map, we can clearly see where we need to direct our efforts."

During the first phase of the project, ISS organized a series of workshops that identified a number of characteristics indicative of vulnerability to heat stress and poor air quality. Those included factors such as age, income, health, the presence of air-conditioning, and access to city services. Using those conditions, the team analyzed city demographic data to reveal at-risk populations.

The population datasets were combined with tree canopy cover for the city, street-level traffic-related air quality records, and high resolution, GPS-located temperature measurements by PSU Geospatial Research Analyst Jackson Voelkel. When combined and layered over a map of Portland the data identified, in vivid color, areas where the city and its partners need to concentrate efforts to mitigate the heat island effect, improve air quality, and protect public health.

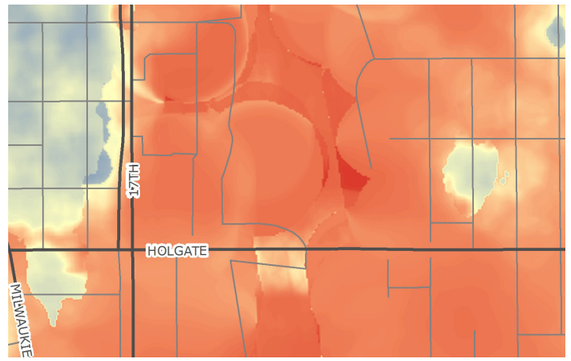
"We need to start a conversation about how people, particularly those in cities, will be exposed to extreme heat, degraded air quality, fires, floods, landslides and other climate-related events."

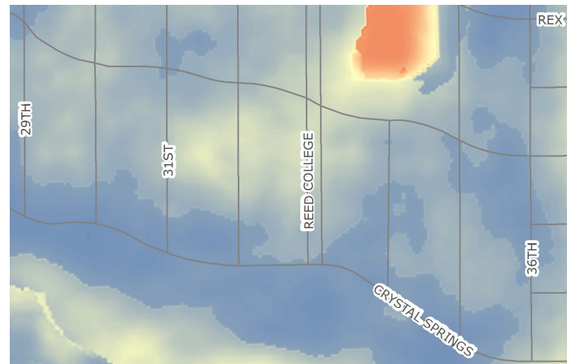
–Dr. Vivek Shandas

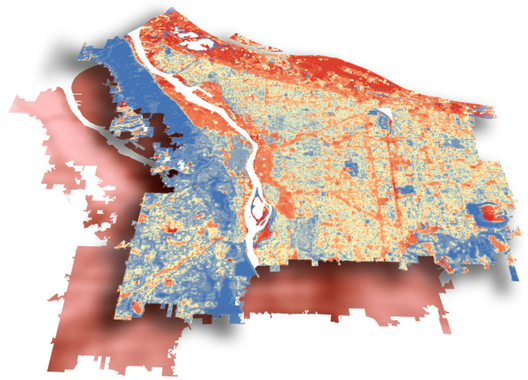
"An advantage of using maps as a tool to present complex issues like managing heat islands in urban settings is that you can communicate huge, complicated data sets in a very accessible way," said Mr. Voelkel. "Maps can help people visualize the unseen world around them. Anyone can see trash on the street. You don't necessarily see air pollution. A map like this changes that."

The map, which is part of an online, interactive toolkit Dr. Shandas is creating in the Sustaining Urban Places Research Lab, will soon be available for public use. When it comes online, users will be able to explore Portland like never before: peering into its hot spots, polluted zones, and comparing their neighborhood to others. They will have means to explore the relationships between tree cover, heat, pollution, and public health right in their own backyards.

"We really hope this map will get people asking questions," Dr. Shandas said. "'Is my neighborhood an urban heat island?' 'What can I do to cool the neighborhood down?' 'Is



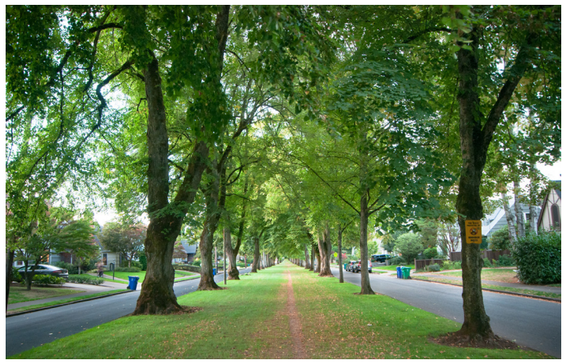




Opposite: *(top and bottom) Ladd's Addition's established and lofty canopy makes it stand out as an urban cool island.*

Above: (top pair) ***The*** *Brooklyn neighborhood's train yard exemplifies the urban heat island effect;* **(middle pair)** *Eastmoreland's shady streets and low building volume reduce temperatures;* **(bottom image)** *the urban heat island map can be combined with other datasets for integrative analysis, in this case with mobile sources of air pollution to illustrate the hottest and most polluted neighborhoods in Portland.*

Photographs © Jackson Voelkel



the air quality in this park healthy enough for a child with asthma to play in?' 'Should the neighborhood establish a plan of action to keep vulnerable residents safe during heat waves?'"

Now that the trouble zones are in plain sight, city and community stakeholders are beginning to act to reduce the heat island effect and improve air quality throughout the city with a focus on those areas identified by the PSU team. As Dr. Shandas noted, no single action will prove successful, but many actions all working in concert could have a significant impact.

"We need to start preparing for the effects of climate change," said Dr. Shandas. "Which means we need to start a conversation about how people, particularly those in cities, will be exposed to extreme heat, degraded air quality, fires, floods, landslides and other events."

That conversation has begun. Researchers at PSU are helping the community identify vulnerable neighborhoods and populations. The city is putting its climate initiatives on the map. And while improving Portland's climate resiliency may not exclude us from longer, hotter summers in the future, it will no doubt improve the protection we can provide to our most vulnerable residents.

ENHANCING NEIGHBORHOOD LIVABILITY

By Shaun McGillis

Photo courtesy of Adam Simmons

In the video game SimCity, players have control over the development of imaginary cities. In reality, taking part in city planning and development requires citizens participate in the process by voting, attending council meetings, joining neighborhood associations, and so on.

At PSU, researchers and cartographers including the Institute for Sustainable Solutions' (ISS) Dr. Rebecca McLain are introducing a novel way to participate in the process of planning the city's future. As a part of the Institute's **Sustainable Neighborhoods Initiative.** Dr. McLain is taking the SimCity-like approach of asking community members where on a map of their neighborhood they believe improvements to infrastructure and other city services are needed.

Two innovative community-based participatory mapping (CBPM) pilot projects led by Dr. McLain aim to demonstrate the advantages of using CBPM as a tool for increasing community involvement in planning and development, particularly in underrepresented populations. As well as facilitating civic participation, the projects will exhibit how CBPM can support the city's social and environmental policy objectives and provide public officials a blueprint of how to implement CBPM in neighborhoods citywide. Both projects are funded by ISS and are part of the Portland Climate Action Collaborative between the Institute and the city's Bureau of Planning and Sustainability.

"We're seeing increased interest in and need for CBPM in Portland," Dr. McLain said. "PSU has the resources and expertise to meet that need."

One of the two projects is taking place in Northeast Portland's Cully Neighborhood. There, Living Cully, a community organization, had identified barriers to safe access to parks for pedestrians and cyclists. To safely navigate around those barriers, the community wanted to develop a "way-finding" system of street signs marking safe routes for people walking or biking.

The project began when students in a community-based GIS course taught by Associate Professor Vivek Shandas created a "virtual tour" of the neighborhood on Google Earth to provide community members a sense of where barriers existed in relation to parks and greenspaces. Keven Donohue, a graduate student on Dr. McLain's team, created table-sized maps of the neighborhood that were later used during a workshop designed to help residents locate the best locations to test the efficacy of way-finding signs.

"At the local level," Dr. McLain said, "the Cully mapping project turned data provided by Living Cully and the community at large into maps residents are using to bring positive changes to their neighborhood by advocating for improvements to Cully's bicycle and pedestrian infrastructure. The project also showed that the needs of the Cully community are in line with the city's plan to reduce carbon emissions by encouraging residents to take more trips by foot and bicycle."

Above: *Photo courtesy of Mark McLure;* **Above right:** *Photo courtesy of Adam Simmons*

To help the city implement similar CBPM projects in the future, Dr. McLain's team is using the knowledge they gained while working with Living Cully to develop a "how to" manual they will present to officials.

The second pilot project is located in East Portland's Lents Neighborhood. There a community organization called Livable Lents is asking residents what they like about their neighborhood and what they think would make Lents a better place to live.

Again, students from Dr. Shandas' GIS course were involved. Graduate students Adam Burnell and Katie Selin, who have joined Dr. McLain's team, incorporated a Google Map component into Livable Lents' survey, which added more layers of information to results collected online. Survey respondents can now pinpoint locations they enjoy within their neighborhood as well as those they think need improvements on a map Livable Lents can use as they lobby for the community.

"The data Livable Lents collects is a reflection of the community's priorities," Dr. McLain said. "When you map those priorities you can see the neighborhood from their perspective. You can see that a road needs improvement here. That it's hard to access a park there. And that there is no place to buy healthy food within walking distance of these streets. When you layer that with census data you get a more complete understanding of the community and the issues important to it."

Dr. McLain's team worked with the community group to refine survey questions, improving the quality of data collected. They enlisted language experts at PSU to translate the survey into Russian, Vietnamese, and Spanish to increase community participation. The team is also assisting in efforts to expand Livable Lents' civic and community partnerships and communicate local priorities to city bureaus as well.

It's not quite the simulated city planning players of SimCity experience, but CBPM does provide communities a map on which to locate their ideas about how to improve quality of life in their neighborhoods. As a tool available to the city, CBPM can help officials identify specific needs within communities, many of which may align with environmental and social policies that aim to increase the livability of every neighborhood throughout the city.

Determining the Value of Portland's Green Infrastructure

By Shaun McGillis

"It's not easy being green."

Take Portland, for example. The city has worked for over twenty years to deliver on commitments to address the causes and prepare for the effects of climate change. Now the city's revised **Climate Action Plan** is doubling down on those commitments, calling for a whopping 80 percent reduction in carbon emissions by the year 2050.

One the greatest assets the city has in its race to cut carbon is green infrastructure (GI)—the green streets, ecoroofs, urban forests, rain gardens, wetlands and other natural and man made features we have all over town. These valuable resources offer the city an innovative way to meet clean air and water goals. That being the case, the planning and policy measures the city is putting into place to manage these ecological resources are just as important as the bioswales, trees, and green roofs themselves.

Top: *Trees in Downtown Portland's Chapman Square (photo by D. Coetzee);* **Above:** *Example of urban bioswales.*

Marissa Matsler, a Ph.D. student in PSU's Toulan School of Urban Studies and Planning, investigates the use of GI and the value of the ecosystem services these assets provide. In a project supported by the Institute for Sustainable Solutions and a part of the Portland Climate Action Collaborative between PSU and the city, Ms. Matsler is working closely with the city's Bureau of Planning and Sustainability to research and evaluate the ecosystem services GI provides in order to begin integrating its management with that of the city's traditional infrastructure.

In order to do so, a cadre of city agencies must come to a consensus about what defines GI, identify GI facilities and networks throughout the city, and determine the value of these assets so resources can be allocated for their management. Ms. Matsler's research aims to help the city answer two questions important to building such a consensus: "how can GI facilities be integrated into existing infrastructure management plans?" and "how are other cities approaching the definition and valuation of green infrastructure?"

To answer these critical questions, Ms. Matsler is conducting a cross-bureau review and analysis of current city policies and planning. She is also working with city officials to identify interdepartmental gaps and synergies. As for the valuation of GI, according to Ms. Matsler municipalities, companies, and government agencies are experimenting with various combinations of creative qualitative and quantitative techniques, along with traditional monetization methods, but there doesn't yet appear to be anything like an "industry standard" for this burgeoning valuation process.

"It's not easy to put a value on these resources," Ms. Matsler said. "If you're looking at a tree, you need ask what it would cost to replace it. You also need to look at the market-based value of the ecosystem services the tree provides: the value of the carbon it sequesters. Then there's the social value of the tree, which is even more difficult to calculate. By contrast, the asset management and infrastructure valuation of traditional infrastructure is based on more concrete calculations like the cost of labor, maintenance, and mechanical components."

Because the approaches for identifying and valuing GI are so radically different from those used to assess traditional infrastructure, it won't be easy for the city to integrate the management of one with the other. But then again, it's not easy being green. And as Ms. Matsler notes, when it comes to seriously considering the value of GI, Portland is ahead of the pack.

"Portland is really leading the way on a lot of this work," Ms. Matsler said. "Our green infrastructure resources are essential to meeting the goals set by the city's Climate Action Plan. That we recognize this and are starting to take green infrastructure seriously just shows how innovative the city is in its approach to addressing climate change."

Top: *Oaks Bottom Wildlife Refuge, Portland, (photo by H.R. Williams);* **Bottom:** *Forest Park, Portland (photo by Robert Tucker).*

Integrating Traffic Management and Air Quality

By Shaun McGillis

In August, when smoke from wildfires burning east of the Cascades blanketed Portland and the Willamette Valley, health experts cautioned the public to limit exposure to the smoky conditions, but also noted that most of us need not worry about such short exposures to poor air quality.

What we perhaps should worry about is the fact that nearly 45 million of us live, work, or go to school within 300 feet of a far more persistent and noxious source of air pollution. Busy roadways are hot spots for gases such as carbon monoxide (CO), nitrogen oxides (NO_x), benzene (C_6H_6), ozone (O_3), as well as harmful particulate matter. The pollutants from a vehicle's tailpipe can affect air quality hundreds of meters away. Those who live or travel along routes within the reach of these emissions are more likely to experience negative health impacts.

Children, older adults, individuals with respiratory or cardiovascular diseases, and people of low socioeconomic status are considered most vulnerable.

In Portland, where urban population density and roadway air pollution collide, the link between public health and transportation is an emerging focus for the city's Bureau of Transportation (PBOT).

According to PSU's Christine Kendrick, whose research looks at vehicle-related pollution and traffic management practices, we need to figure out how exposed we are to air pollution from major roadways. With that information, we can begin determining health impacts and perhaps use technologies such as intelligent transportation systems to improve conditions.

Ms. Kendrick is an Environmental Science and Management Ph.D. candidate in PSU's School of the Environment. Her work is funded through a prestigious STAR Graduate Fellowship from the Environmental Protection Agency.

Under the guidance of Environmental Science and Management Professor Linda George and through a unique partnership with the city, Ms. Kendrick has collected data from a first-of-its-kind US urban roadside monitoring station.

At the intersection of Portland's SE 26th Avenue and Powell Boulevard, sensors continuously record wind speed and direction, temperature and humidity, traffic-related particulate matter, NO, and NO_2. The site was chosen to support understanding of the interaction of roadside air quality with

photo courtesy of Trimet

an adaptive traffic signal system that adjusts the timing of red and green lights in response to real-time traffic conditions. Traffic volume, measures of congestion, and detailed signal operation data are calculated from the adaptive signal system so that they can be correlated with the air quality data. PBOT's Signals, Street Lighting, and Intelligent Transportation Systems Division, managed by Peter Koonce, has been a key supporter of this unique simultaneous collection of transportation and air quality data.

Ms. Kendrick is analyzing a year's worth of data and developing statistical models to test the proposition: can scientists, health officials, and transportation managers use traffic volumes as a proxy for exposure to vehicle-related pollution on or nearby urban roadways like Powell Boulevard? This work has recently been accepted for publication in *Atmospheric Environment*.

According to Ms. Kendrick, the data collected at the Powell station will help cities answer some important questions. Can we optimize traffic flows to reduce congestion and air pollution? Will the coming bus rapid transit line along the Powell corridor influence roadway pollution? How do patterns of exposure vary diurnally with traffic patterns and meteorology? And how can we use detailed traffic and air quality data to help support multi-modal transportation?

"What we've found is that traffic volumes can give us a decent sense of annual exposure to traffic-related pollutants at the test site," Ms. Kendrick said. "But if we want to start understanding the health impacts of exposures happening during periods of heavy and light traffic throughout the day, we need to add to the wealth of data we've already collected. And that is where we're heading."

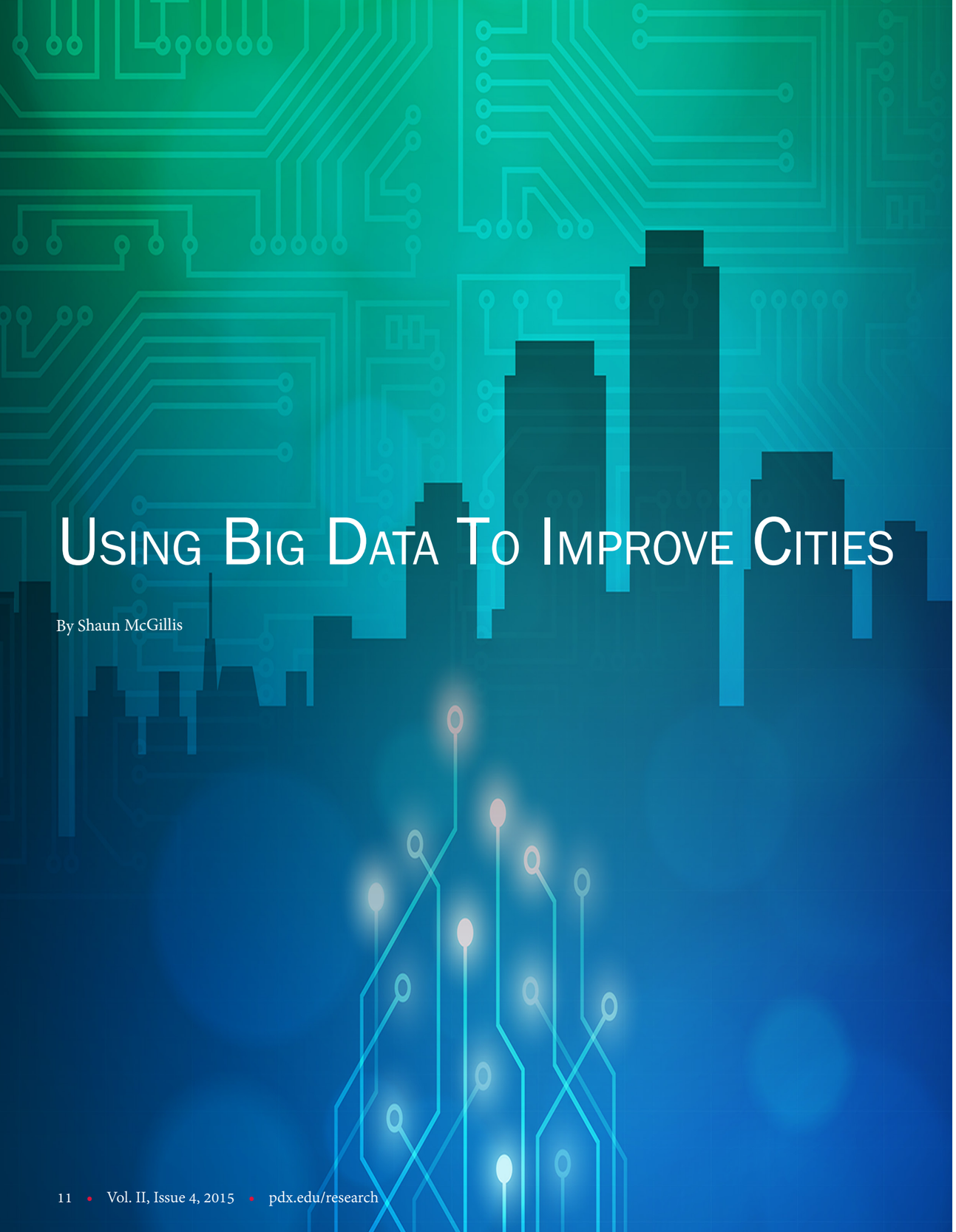
Planned future projects will incorporate real-time, networked air pollution sensing systems that will gather the highly detailed data needed to build models capable of characterizing exposure on time spans experienced by people waiting for a bus, walking within the corridor, or playing in the park next to the site.

Portland is the first city in the US to examine the relationship between traffic, air pollution, and public health from a precise location on a major roadway within the city's urban core. The goal for PBOT is to strengthen the linkages between and the understanding of how multimodal transportation supports the public health of the community. As Dr. George noted, the research complements PSU's commitment to "let knowledge serve the city."

The smoke that blew into town in August cleared in days. Vehicle pollution, on the other hand, isn't likely to disappear anytime soon. In order to arrive at the multitude of solutions needed to answer the question of what to do about the negative health effects associated with vehicle emissions from busy roadways, the city will first need to understand what the actual risks to public health are. Because of PSU researchers like Christine Kendrick and Professor Linda George, and collaborations with innovative partners at the City of Portland, we are one step closer to clearing the air.

Using Big Data To Improve Cities

By Shaun McGillis



When Baby Boomers were growing up, the only really large data sets they encountered were packaged and left on doorsteps: telephone books. More recently, financial markets, large array telescopes, particle accelerators, and the NSA were the primary generators of "Big Data." But over the past decade as sensors have become cheaper and more powerful and as the wireless Internet has expanded, huge troves of data are being created almost everywhere.

Cities are among the most popular places where these ubiquitous sensors are being deployed. Chicago, San Jose, Atlanta, New York, and Portland are now using state-of-the-art technologies to gather and archive data from myriad sources to combat climate change, improve public health, reduce crime, manage transportation systems, and more. While this data explosion opens doors to new and unseen opportunities for cities to address complex urban issues, managing and deriving meaningful information from such vast databases presents a number of unique challenges.

Computer scientist Dr. Kristin Tufte knows how difficult working with high volume, high velocity, and high variety "big data" is. A Research Assistant Professor in PSU's departments of Computer Science and Engineering, and Civil and Environmental Engineering, she investigates methods of processing streams of data from sources too large and unruly for traditional analytical methods to make sense of. Her research for local, state, and federal agencies and organizations such as the Intel Science and Technology Center for Big Data (based at MIT) and the Volpe National Transportation Systems Center spurs innovations in big data management, storage, and query that improves the way we turn data into information and knowledge.

One of Dr. Tufte's many research interests is developing and deploying innovations in data stream processing to transportation systems. She has partnered with Oregon's and Washington's Departments of Transportation, the Southwest Washington Regional Transportation Council, the Portland Bureau of Transportation, and others to provide improved transportation measurements across the region, including the real-time estimates of travel time seen on the digital signs recently added to freeways throughout the Portland-Vancouver area.

A researcher for the Transportation Research and Education Center at PSU, Dr. Tufte manages and maintains **PORTAL, the official data archive for our region's transportation agencies**. This real-time, multi-modal transportation information streams in from roadways and vehicles all around the area. The website provides the public with snapshots of traffic movement on major roadways, travel time, transit service, and more. Transportation officials, meanwhile, use PORTAL to improve the ways they assess, manage, and model the transportation system in a city that can claim it has both the 10th-worst for traffic in the nation according to the TomTom Traffic Index and the highest percentage of bike commuters for a large American city.

Cities and metropolitan regions that deploy information and communication technologies to improve infrastructure management are frequently referred to as "smart cities." Here at PSU, Dr. Tufte is one of a handful of researchers taking part in smart city research projects related to the **MetroLab Network** recently announced at the White House. The Network is an innovative, collaborative coalition of university-city partnerships from around the country that have agreed to research, develop, and deploy technologies and analytically-based solutions to overcome challenges facing our nation's urban regions.

"We are collecting data city policy makers and planners will be able to use to make more well-informed decisions."

–Dr. Kristin Tufte

Here in Portland, Dr. Tufte will participate in a public-private partnership between the City of Portland, PSU, and Intel to install state-of-the-art sensor technology along the proposed Powell-Division bus rapid transit corridor. The project will monitor air quality using inexpensive remote sensing technology, traffic data collected by the city of Portland, and the impact of the new bus line on the character of neighborhoods it passes through.

"There is a lot of traffic and air quality data already collected along the Powell corridor," Dr. Tufte said. "The plan with this project is to install a number of sensors that will gather air quality data at multiple locations along the corridor and then to start comparing the air quality and traffic data to see if there is a correlation between the two. Whether we find a relationship or not, we are collecting data city policy makers and planners will be able to use to make more well-informed decisions relating to the city's transportation system."

As Internet, marketing, financial, and other organizations increasingly use big data to their benefit, so too are cities beginning to utilize data streaming technologies to assist their communities. At PSU, Dr. Tufte's research increases our capacity to harness data to improve how cities take on challenges such as modeling critical systems, combating climate change, and improving quality of life.

Photo courtesy Vis-a-Vis

Feeding the Regional Economy

By Shaun McGillis

From food carts to farmer's markets, fine wine and high-end dining to burgers and beers at neighborhood brew pubs, Portland is a hub for food and foodies alike.

What that means for the local economy is highlighted in a new report from Toulan School of Urban Studies researchers Drs. Greg Schrock, Jenny Liu, and graduate student Jamaal Green. The "food economy" combines four broad sectors: production, processing, distribution, and services. As the report makes clear, the economic impact of food on the city and the surrounding region amounts to a whole lot more than a hill of organic beans.

A first-of-its-kind in scope, covering the food economy from farm to table, the report examines the workforce and economic output of food-related industries in Multnomah, Clackamas, Yamhill, Washington, and Columbia counties. Spread across 31 industries, the region's food economy accounts for an impressive 167,092 jobs according to 2012 data. In Portland alone, just over one in every ten jobs—nearly 40,000 paid positions—is in the food industry. Regionally, that workforce generates $6 billion dollars in income and allows local governments to collect $600 million in taxes and fees. The total output of the food economy in the five counties included in the study is nearly $22 billion.

According to Dr. Schrock, city, county, and metro officials recognize that the region's food system provides critical resilience in light of factors like increasing population density, development, and climate change, which all pose threats to the larger economy. At risk are thousands of jobs, food security, efforts to increase sustainable practices in food-related urban and rural settings, and endeavors to increase social equity for residents and workers throughout the region. In order to better understand what's at stake, the Institute for Sustainable Solutions (ISS) at PSU funded the study of Portland's food economy, which is also part of the Portland Climate Action Collaborative partnership between ISS and Portland's Bureau of Planning and Sustainability.

The report addressed a number of questions city officials had about the region's food economy. From what sectors is it comprised and where are those sectors located? How large is it? Whom do the various food-related industries employ, for what, and how well are employees compensated? How does Portland's food economy compare to that of other regions and the nation as a whole? And what is the overall impact of food production, processing, distribution, and services on the regional economy?

"We're big on food here in Portland," said Mr. Green, whose research focuses on economic development, planning, and urban manufacturing labor markets. "But that enthusiasm doesn't tell us much about what the growth of the food economy actually means for those people working in it. To get a handle on that we need to know what sectors are growing, what sectors are shrinking, and why. And then we need to ask how those changes are affecting the labor market. That's what we went about doing in the report. And now that we have that data, the city can use it in support of efforts to develop and implement policies related to labor and food."

The report shows that between 2002 and 2012, job numbers in food production shrank somewhat, while the processing and distribution sectors posted modest, but continued growth. The food services sector, however, which includes grocery stores, specialty food retailers, and restaurants showed tremendous expansion during that same time period, adding almost 10,000 jobs.

The study also reveals that annual wages in the food economy range from roughly $20,000 in food services to nearly $50,000 for some positions in food distribution. The annual average wage of $25,000 for a food economy worker is far below that of the average worker in other, non-food related sectors. The hourly rate of about $12.50 is barely half the $23.11 "living wage" for a single adult with one child in Multnomah county, and even below the $15.26 rate for a family with two working adults and two children.

In addition to position and wage data by sector, the report also highlights the diversity of the food economy workforce, the geographical distribution of food production,

Photo courtesy Jim Fisher

processing, distribution and service jobs in the City of Portland and throughout the region, and the growth of niche industries.

"Sustainability may not immediately come to mind when thinking about an economic analysis like this," Dr. Schrock said. "But it fits into a way of thinking that encompasses a broader framework. It isn't just about the environment. Sure that's a big part of it, but we have to include social opportunity and equity. The food economy and the opportunities it provides the workforce are an integral part of thinking about sustainability in the context of social justice and equity."

Across the food economy growth has meant positive changes for some industries and stress for others. Rising property values, particularly in the city's Central East Side, are changing the location and character of the food processing and distribution sectors. Rising rents are driving well-paying jobs that do not require postsecondary training or credentials away from the city's interior. Meanwhile, decentralization of food services is opening niche markets for retailers eager to tap into communities that may not have had localized food options in the past.

With knowledge of how the regional food economy is growing, where growth is taking place, and who is benefiting from the change, city, county, and regional officials can make more informed decisions about how to plan to address food-related threats, while keeping the city moving forward in a fair and balanced way.

PSU and the City of Portland Partner on "Smart Cities" Initiative

By John Kirkland

Portland State University (PSU) and the City of Portland will partner on a series of "smart city" projects over the next year as part of a national MetroLab Network initiative, announced at the White House on Sept. 14.

PSU and Portland are among 20 city-university pairings throughout the United States taking part in the initiative, in which partners will research, develop and deploy innovative technologies to address challenges facing the nation's urban areas.

The White House statement about the MetroLab Network was part of a larger event announcing other smart cities programs being launched on the federal level. The Smart Cities Initiative will invest more than $160 million in federal research and leverage new technology innovations to help local communities tackle key challenges such as reducing traffic congestion, fighting crime, fostering economic growth, managing the effects of climate change and improving the delivery of city services.

The projects that PSU and the City of Portland will focus on center around Portland's mass-transit system, including a new bus rapid transit line along the Powell-Division corridor that Portland and TriMet plan to put in place in 2020. PSU researchers will work with the city and other partners to measure and compare air quality and traffic along the corridor using the latest sensor technology. They also will use sensors and traditional surveys to collect data showing how the new rapid transit line affects the character of neighborhoods it passes through. A third project will engage artists and educators to design lighted art installations at stations near PSU and along the Powell-Division corridor.

"Through its land-use, transportation and climate policies, Portland, in collaboration with PSU researchers, has become known as one of the nation's greenest and most livable metropolitan areas," said Jonathan Fink, PSU's vice president for research. "Our participation with the City in the MetroLab Network will assure that our region remains on the forefront of urban innovation."

The MetroLab Network will provide opportunities for the participating cities and universities to share information on the successes and challenges of their projects. By becoming part of MetroLab, the City of Portland and PSU are committing to collaborate not only with themselves, but with other cities and universities in the nationwide network.

The initial launch of the MetroLab Network is funded by a $1 million grant by the John D. and Catherine T. MacArthur Foundation. The grant is one of a small number of investments by the Foundation to support data and information technologies to better understand how cities work and to improve the urban condition.

Lisa Zurk Named Associate VP of Research

Lisa Zurk, Maseeh Professor of electrical and computer engineering and an expert in remote sensing techniques, has been appointed Portland State University's associate vice president for research.

Zurk replaces Mark Sytsma, freshwater ecologist and environmental science professor, who served as associate vice president for four and a half years. Like Sytsma, Zurk maintains one of PSU's largest externally funded research programs. The National Science Foundation, Office of Naval Research and DARPA have supported her research portfolio, much of which is carried out in collaboration with professor Martin Siderius.

In her new position, Zurk's main role will be to help grow the competitive research enterprise at PSU. This requires expanding the services the university's research office provides to PSU faculty, which includes mentoring and instructing faculty to help them receive grants and publish their work. She also will help raise the visibility of research within PSU and identify new opportunities for large-scale projects of interest to federal agencies and philanthropic foundations.

With associate vice president for strategic partnerships Erin Flynn, Zurk also will seek to enhance PSU's major collaborations with OHSU, Intel, City of Portland, Technology Association of Oregon, OMSI and other organizations promoting Metro Portland's innovation agenda.

"We are extremely fortunate to have someone with Lisa Zurk's background joining us at this time," said Jonathan Fink, Vice President for Research and Strategic Partnerships. "Over the past several years, Mark Sytsma and other members or our team have put together a first-class administrative system to serve our faculty, staff and student researchers. With these capabilities in place, we now turn to Lisa to help expand the scale of PSU's research enterprise so that we can better contribute to the innovation and economic development needs of our region and the nation."

Zurk came to PSU in 2005 from MIT's Lincoln Laboratory, where she spent 10 years conducting research on the physics of electromagnetic and acoustic wave propagation -- problems that are relevant to a host of applications ranging from mapping marine mammal populations to detecting hidden explosives. Prior to MIT, Zurk spent four years developing biomedical instrumentation for private industry. She was a recipient of the prestigious PECASE and CAREER awards from the National Science Foundation, and has brought more than $6 million of external research funding to PSU.

She received her bachelor's degree in computer science from the University of Massachusetts, her master's in electrical and computer engineering from Northeastern University and her Ph.D. in electrical engineering from the University of Washington.

By John Kirkland

PSU Leads Study on Cities and Extreme Climate Events

Portland State University (PSU) faculty are part of an international, interdisciplinary research project to study how urban areas can be more resilient to increasingly common extreme weather events. Portland will be one of nine cities in the **Urban Resilience to Extremes Sustainability Research Network**, a five-year project involving more than 25 institutions and 70 collaborators funded by $12 million from the National Science Foundation. The program is based in Arizona State University's Global Institute of Sustainability.

PSU assistant professor Thad Miller, a specialist in urban sustainability in the Toulan School of Urban Studies and Planning, is part of the network's Executive Management Team and will coordinate Portland-based research in the project. Heejun Chang, professor of geography; Alan Yeakley, professor of environmental science; Jennifer Morse assistant professor of environmental science; and Vivek Shandas, associate professor of urban studies and planning complete the interdisciplinary PSU team. Researchers in the network will also work closely with policy-makers and practitioners in each city to understand unique urban challenges and align the research with real-world impact. In Portland, researchers will collaborate with officials in the City's Bureau of Environmental Services, Bureau of Planning and Sustainability, and other organizations to evaluate the city's urban infrastructure with an eye toward resilience to extreme weather events.

"Urban areas, including Portland, are experiencing extreme climate and weather events—flooding, storms, droughts, heat waves—with increasing frequency and intensity in a changing climate" said Miller, who is also a PSU Institute for Sustainable Solutions Fellow. "The ultimate goal of this radically interdisciplinary research project is to identify how our urban infrastructure is vulnerable or resilient to a rapidly changing climate and, by doing so, creating cities that are flexible, adaptable, and more socially equitable."

The Urban Resilience to Extremes Sustainability Research Network, which spans the United States and Latin America, will develop a new framework for analyzing and supporting infrastructure decisions that integrates social, ecological, and technological systems. Researchers in the network will work together on modeling, data analysis, and scenario analysis with an eye toward outcomes that will meet 21st century city goals of equity, resilience, and sustainability.

Network cities in the U.S. in addition to Portland include Baltimore, Miami, New York, Phoenix, and Syracuse, as well as Hermosillo, Mexico; San Juan, Puerto Rico; and Valdivia, Chile.

By Christina Williams

The Cleantech Challenge Wraps up a 3rd Successful Year

By Christina Williams

When the dust settled in last month's PSU Cleantech Challenge presented by Wells Fargo and hosted by Portland State University, one team emerged victorious to claim the top prize. Over the course of the competition, six teams from five Portland-area schools honed their earth-friendly innovations, gained valuable professional experience, and competed for a total of $40,000 in funding.

The winning group, from Oregon Institute of Technology's Wilsonville campus, was awarded the $10,000 grand prize. The Waste2Water team developed an anaerobic digester with a water distillation system that can process waste, reduce methane emissions and produce and desalinate clean water. The Waste2Water display included jars showing purified Willamette River water suitable for drinking.

The second-place prize of $5,000 went to a team from Portland State University, Baldr, made up of Ben Hendrickson, Joshua Olsen, and Nick Day, an interdisciplinary group of physics and chemistry students and their adviser, Morley Blouke, an imaging group researcher. The innovation was a more robust and less expensive solar power converter. The Baldr team competed in last year's PSU Cleantech Challenge and further refined their invention in the 2015 competition.

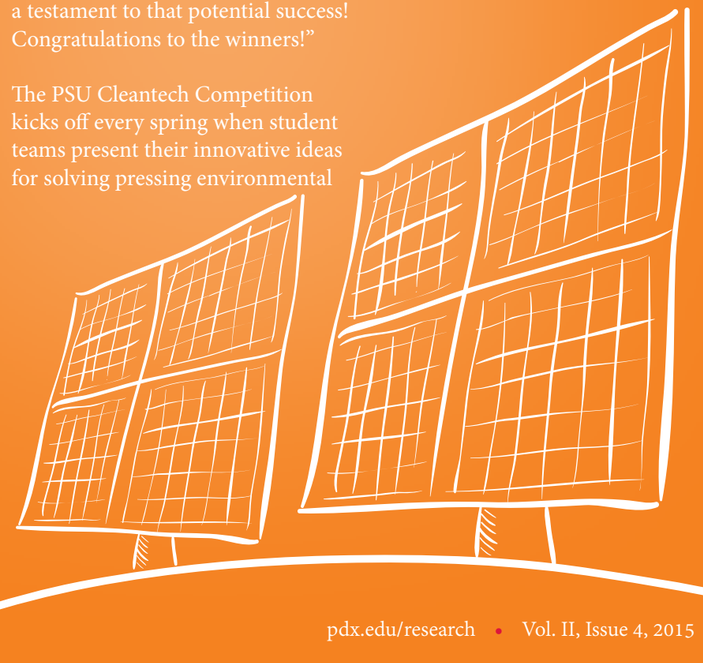
In addition, a $2,500 prize for having the best pitch was awarded to a team from University of Portland that makes audio equipment from salvaged materials. Environmental Audio delivered their winning message in front of an audience of 40 cleantech entrepreneurs and professionals who served as judges. A second $2,500 prize for People's Choice was awarded to Birds to Know, a team from Reed College making bi-lingual birding cards for Portland. The People's Choice Award was determined by votes from attendees to the 2015 Oregon BEST FEST, the annual cleantech showcase that hosts the PSU Cleantech Challenge finals.

This third PSU Cleantech Challenge extended beyond Portland State University to all Portland-area schools. Next year, the competition will expand statewide, thanks to a three-year $300,000 grant from Wells Fargo.

"Wells Fargo believes that investing and mentoring the next generation of clean technology entrepreneurs will support the long-term growth and success for the entire sector," said Ashley Grosh, vice president of the Environmental Affairs Group at Wells Fargo. "This year's winners are a testament to that potential success! Congratulations to the winners!"

The PSU Cleantech Competition kicks off every spring when student teams present their innovative ideas for solving pressing environmental problems. Semifinal teams receive $2,500 toward developing a prototype of their design. Students receive support and coaching over the course of the summer not only to develop a working prototype but to also hone business skills.

"The judges today got to see the results of a summer of very hard work—most of the teams started in June with nothing more than an idea or a drawing in a lab notebook," said Quinn Read, PSU Cleantech Challenge project manager and a mentor to challenge participants. "The prize money is great motivation, but what makes the Challenge truly rewarding for students is having a vehicle to get their ideas off the ground."



NIH Awards PSU Researchers $3.5M to Study E-Cigarettes

By Chelsea Bailey and Julie Rutherford

Portland State University researchers will substantially expand their groundbreaking research into possible toxins produced during e-cigarette use, or "vaping," with a $3.5 million grant from the National Institutes of Health (NIH).

The NIH grant will allow Professor Robert Strongin and co-investigators James F. Pankow, and David Peyton, to launch a larger-scale investigation into the mostly unknown public health effects of e-cigarettes.

The team's preliminary research underscored the need for more information. In a study published earlier this year in the *New England Journal of Medicine*, they revealed that vaping devices can provide a previously unknown reaction pathway to deliver high levels of formaldehyde, a known carcinogen. Further research conducted by the PSU team found that certain flavor chemicals recognized by toxicologists to be "primary irritants" of the respiratory tract are present in some e-cigarette fluids at high enough concentrations to expose daily vapers to twice the recommended occupational limits for those chemicals.

"We will be employing more researchers and studying the vast array of e-cigarette devices and liquids available on today's unregulated market," said Strongin. "Our first study gave us a reliable method for identifying toxic chemicals in e-cigarettes—now our goal is to better understand the processes that may create them during vaping and find ways to minimize them."

With collective expertise in synthetic chemistry and engineering, Strongin and his colleagues have distinguished their research approach by examining the variables of e-cigarettes as they differ from regular tobacco products.

"What makes us a unique team is that we've been able to conclusively identify potentially hazardous compounds that were previously overlooked," Strongin said. "We are also able to explain when and why these chemical reactions are likely to occur."

E-cigarette use has grown so rapidly that some experts project e-cigarette sales may eclipse that of traditional cigarettes within the next decade. A lack of reliable information on the health effects of vaping and second-hand vapor has hampered regulatory efforts in what has conservatively become a $2 billion a year industry.

Funding for the NIH grant is provided by the U.S. Food and Drug Administration (FDA) Center for Tobacco Products as mandated by the Family Smoking Prevention and Tobacco Control Act.

"This investment from the FDA and NIH highlights how competitive PSU is becoming in the health sciences," said Jonathan Fink, vice president for Research and Strategic Partnerships. "The research team's extensive experience for designing studies that lead to health care advances will have a substantial impact on the ability of national policymakers to promote and protect public health."

Professional Development in the 21st Century

By Shaun McGillis

"How do you get to Carnegie Hall?"

"Practice!"

Practice, training, and professional development have become big business. Worldwide, organizations are spending over $130 billion a year to improve their employees' productivity. In support of these considerable investments in time and capital, new emerging technologies such as virtual learning and self-authored video instruction are changing the ways millions approach education, training, and professional development.

One such technology is the **Virtual Coaching Platform** (VCP), created to support researchers in the Regional Research Institute for Human Services (RRI) at Portland State. VCP allows users to maximize the value of training activities in a variety of contexts. With VCP, users can upload video and other content that shows their task-related skills and abilities in action for evaluation by their organization's training facilitators.

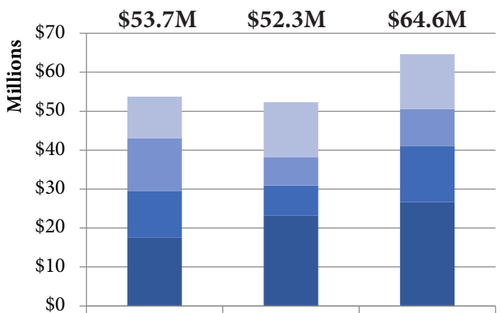
Trainers using the VCP can create custom performance evaluations using metrics that matter to the organizations they represent. They can also parse files at intervals to provide general feedback, add specific comments at any point in time during audio or video files, and embed files that demonstrate expert practices for users to reference. Unlike other virtual coaching platforms, VCP's video-based approach does not necessitate "live-as-it's-happening" training evaluation, which frees users and facilitators alike to participate in training activities without disrupting work-flow or paying for traveling costs.

VCP is currently used by organizations supporting child and family services at seven sites in Massachusetts. It was recently adopted by the Institute for Innovation and Implementation at the University of Maryland School of Social Work for use on a nationwide training program.

"The VCP is an excellent tool for providing training and coaching services in a variety of settings," said John Ossowski, a RRI research associate. "I really see this as a tool organizations both in and out of the academy can use to maximize their efforts to improve performance, sustainability, and excellence for all. The versatility of the platform and the simplicity of the user interface make this a great tool for anyone or any organization that wants to improve their knowledge, skill set, and ability."

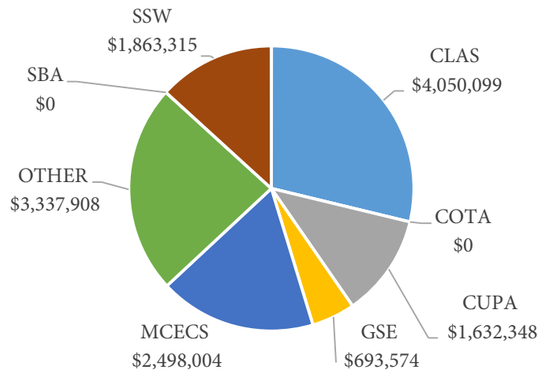
Technology has changed the way we work and learn over the last few decades. By conducting training via the VCP users can receive specific advice about the practices they need to improve to best perform a task. Administrators or project facilitators on the other hand can offer their students or employees the tailored training they need to reach their maximum potential, whether it's providing mental health services to a child or playing music at Carnegie Hall.

Awards by Quarter



	FY 2013	FY 2014	FY 2015
Q4	$10,671,222	$14,107,038	$14,075,248
Q3	$13,504,425	$7,285,660	$9,507,525
Q2	$11,895,294	$7,751,427	$14,362,186
Q1	$17,639,091	$23,177,101	$26,694,845

Awards Received Q4



Questions about sponsored projects, research integrity:
pdx.edu/research/university-research

Selected Awards Q4

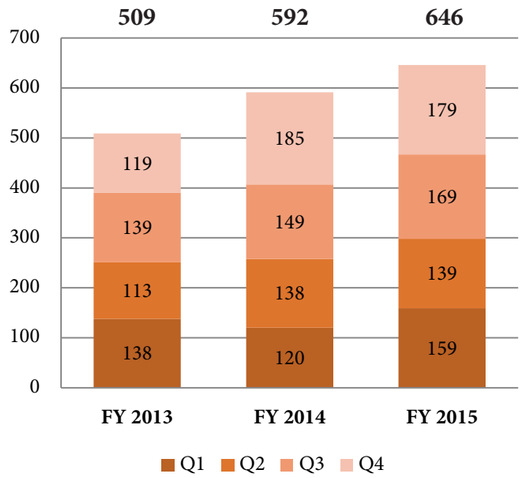
View the complete list of awards at:
pdx.edu/research/university-research

Abramson, Jonathan; *Development of Novel Compounds for Treatment of Arrhythmias in CPVT*; National Institutes of Health; $220,750; **CLAS**; New Award
Bates, Lisa; *Portland Single Family Weight Study 2015-2017*; City of Portland; $80,297; **CUPA**; New Award
Brown, Julie; **Loman, Sheldon**; **Falco, Ruth**; *Diverse Special Educators (DiSE)*; US Department of Education; $249,989; **GSE**; New Award
Cal Santiago, Raul B.; *Collaborative Research: Measurement and Modeling of Air Entrainment and Ash Distribution in Weak Volcanic Plumes*; National Science Foundation; $178,855; **MCECS**; Amendment
Castek, Jill; **Reder, Stephen**; *Training Researchers to Use PIAAC to Further Multidisciplinary Research*; US Department of Education; $270,576; **CLAS**; New Award
Deardorff, Pam; *Statewide Training and Certificate Scholarship Program*; Oregon Community Foundation; $100,000; **GSE**; New Award
Delcambre, Lois; **Recktenwald, Gerald**; *Cyber Discovery*; Department of Homeland Security; $173,650; **MCECS**; New Award
Dill, Jennifer; *Equity Outcomes and Potential for Better Bike Share*; People for Bikes; $74,986; **TREC**; New Award
Dill, Jennifer; *NITC National University Transportation Center*; US Department of Transportation; $7,479,900; **TREC**; Amendment;
Erickson, Brittany; *The Effects of Plasticity and the Evolution of Damage Zones in Earthquake Cycle Situations;* National Science Foundation; $81,000; **CLAS**; Amendment

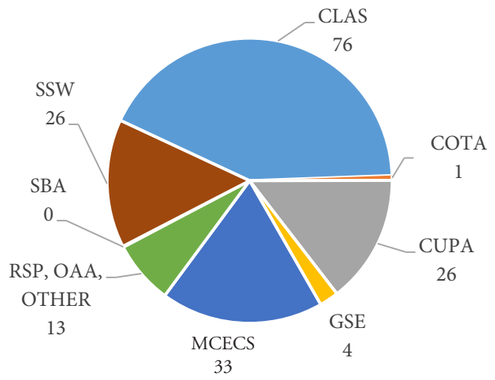
View the complete list of awards at:
pdx.edu/research/university-research

Feng, Wu-Chi; *CI-P: Shared Open-Source Tools in Support of Multimedia Systems Education and Research*; National Science Foundation; $80,874; **MCECS**; New Award
Gil-Kashiwabara, Eleanor; *Quartz Valley Circles of Care*; Department of Health and Human Services; $79,971; **SSW**; New Award
Granek, Elise; **Lubitow, Amy**; *CIRC INACaMMP: Information Needs Assessment for Coastal and Marine Management and Policy in the Pacific Northwest: Ecosystem Services Under Changing Climatic, Land Use and Demographic Conditions;* National Oceanic and Atmospheric Administration; $103,560; **CLAS**; New Award
Guerrant, Ed; *CCSP Western Lily Studies*; Bureau of Land Management; $15,984; **CLAS**; New Award
Hammer, Leslie; *Oregon Healthy Work Life Center (Years 4 & 5)*; Centers for Disease Control and Prevention; $245,946; **CLAS**; Amendment
Hammer, Leslie; *Social Support During a Randomized Trial of a Trucker Weight Loss Intervention*; National Institutes of Health; $124,576; **CLAS**; Amendment
Haun, Julie; *English for Graduate Studies Program*; US Department of Defense; $247,228; **CLAS**; New Award
Henning, Kris; **Renauer, Brian**; *Portland Neighborhood Involvement Locations Evaluation*; US Department of Justice; $304,000; **CUPA**; New Award
Jay, David; **Talke, Stefan**; *LPR and Newark Bay Sediment and Contaminant Dynamics: Task Order 2*; Tierra Solutions, Inc.; $547,064; **MCECS**; New Award
Jiao, Jun; *Development of High-Quality Spin Interconnects from CVD-Grown Graphene*; Intel Corporation; $100,000; **MCECS/CLAS**; New Award
Johnson, Gwynn; *Development and Testing of the Vorsana Shear Retort*; Oregon BEST; $150,000; **MCECS**; New Award
Kelly, Jane; *Novel Broad-Spectrum Antimalarials*; National Institutes of Health; $2,824,473; **CLAS**; Amendment
Labissiere, Yves; *GEAR UP Mobilizing for College*; Portland Public Schools; $569,600; **UNST**; New Award
Lawson, Holly; **Botsford, Kathryn**; *Vision Professionals for Under Served Areas (VIPs-USA)*; US Department of Education; $249,930; **GSE**; New Award
Lowrey, Marty; *Safer Futures Grant (IPV 2015)*; Department of Health and Human Services; $76,619; **SSW**; New Award
Neal, Margaret; **De La torre, Alan**; *Age-Friendly Multnomah County Project*; Multnomah County; $50,000; **CUPA**; New Award
Oschwald, Mary; **Powers, Laurie**; *Field Initiated Program (Internet Safer and Stronger Program for Men with Disabilities [Men's SSP])*; Department of Health and Human Services; $192,843; **SSW**; New Award
Sailor, David; *Collaborative Research: Development of a Multi-scale Model to Determine Optimal Urban Heat Mitigation Strategies for Vulnerable Populations in a Changing Climate*; National Science Foundation; $141,148; **MCECS**; New Award
Sailor, David; **Hu, Huafen**; *Ozone and Heat Exposure in Warming Climate Risks*; Environmental Protection Agency; $478,764; **MCECS**; New Award
Singer, Laurel; *Oregon Early Learning Hub Leadership Institute Grant Agreement*; Oregon Department of Education; $414,540; **CUPA**; New Award
Strecker, Angela; *EAGER: Metapopulation and Metacommunity Dynamics in a Changing Spatial and Environmental Mosaic - The Importance of Dispersal and Gene Flow*; National Science Foundation; $157,993; **CLAS**; New Award
Walker, Janet; *Rehabilitation Research and Training Centers (RRTCs) Program*; Department of Health and Human Services; $729,031; *SSW*; New Award
Weislogel, Mark; *Geometry-Driven Capillary Flow*; National Aeronautics and Space Administration; $623,786; **MCECS**; Amendment
Williams, Dilafruz; *Science in the Learning Gardens for Middle Grades at Lane and Lent Schools*; Portland Public Schools; $55,370; **GSE**; New Award
Xie, Fei; *Binary-level Software Testing*; Intel Corporation; $40,000; **MCECS**; New Award
Yeakley, Alan; *Oligohaline Tidal Wetland Plant Community Restoration and Response to Changes in Tidal Flooding and Salinity (K-12 Fellow: Sarah Kidd)*; National Park Service; $7,697; **CLAS**; New Award

Proposals by Quarter



Proposals Submitted Q4



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Selected Proposals, Q4

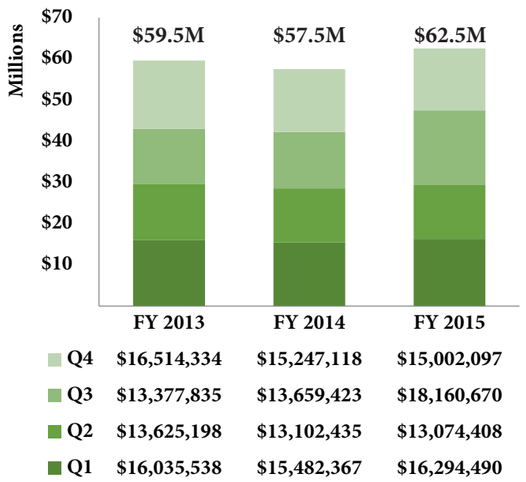
View the complete list of proposals at:
pdx.edu/research/university-research

Adler, Seymour; *Oregon Planning Forum*; Oregon Dept of Land Conservation and Development; $50,000; **CUPA**
Ballhorn, Daniel; *The Epigenetic Contribution to Gain-Due-to-Selection in Crop Breeding*; National Science Foundation; $2,692,932; **CLAS**
Buckley, Brad; *Cellular Life and Death in the Cold: Apoptosis and DNA Damage in Antarctic Fish*; National Science Foundation; $767,264; **CLAS**
Cahn, Katharine; *Child Welfare Partnership 2016-2017 Project Agreements*; Oregon Department of Human Services; $13,318,948; **SSW**
Cal Santiago, Raul B; *PMLR, Innovation Quadrant, Vertical Axis Wind Turbines Research and Analysis*; Trimet; $80,000; **MCECS**
Chen, Zhiqiang; **Jiao, Jun**; **Hugo, Richard**; **Johannson, Erik, Koenenkamp, Rolf**; *NNCI: Enabling Nanotechnology Education and Research Nationwide via Portland State University's Self-Sustaining Center for Electron Microscopy and Nanofabrication*; National Science Foundation; $8,679,583; **RSP**
Daim, Tugrul; **Lutzenhiser, Loren**; **Wakeland, Wayne**; *Evaluating the Diffusion of Solar Electric Systems in Pacific Northwest Residential Sector*; National Science Foundation; $392,942; **MCECS**
De Pry, Randall; *TeachOregon Project with the Chalkboard Project*; David Douglas School District; $231,720; **GSE**
Delcambre, Lois; *Track 1: EI: Equipping Middle School Teachers to Use STEM Robotics as a Gateway to Computer Science*; National Science Foundation; $349,167; **MCECS**
Delcambre, Lois; **Recktenwald, Gerald**; *Cyber-Discovery Camp at Portland State University 2015*; US Department of Homeland Security; $173,650; **MCECS**

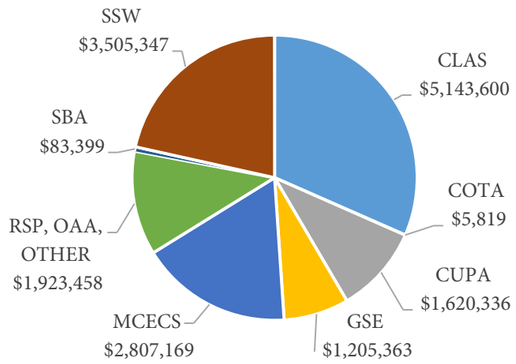
View the complete list of proposals at:
pdx.edu/research/university-research

Erickson, Brittany; *Collaborative Research: From Loading to Rupture - How do Fault Geometry and Material Heterogeneity Affect the Earthquake Cycle?*; National Science Foundation; $241,760; **CLAS**
Feng, Wu-Chi; **Figliozzi, Miguel**; *VEC: Medium: Collaborative Research: Large-Scale Visual Computing from World-Wide Data Streams*; National Science Foundation; $789,001; **MCECS**
Green, Beth; *LAUNCH Expansion Evaluation*; Substance Abuse and Mental Health Services Administration; $406,817; **SSW**
Hammer, Leslie; *Comparing the Effectiveness of Work-Family Workplace Interventions*: Effects on Worker, Family, and Organizational Well-being; National Institutes of Health; $3,634,353; **CLAS**
Hara, Moti; **Del La Vega, Esperanza**; *Portland State University - Portland Public Schools Equity Research Partnership*; Spencer Foundation; $399,974; **GSE**
Iwata-Reuyl, Dirk; *Complex Modifications of tRAN: Regulatory Roles and Crosstalk with DNA Metabolism*; National Institutes of Health; $170,950; **CLAS**
Kahn, Kimberly; **Thompson, Melissa**; *Mental Illness, Race, and Police Use of Force*; US Department of Justice; $449,318; **CLAS**
Kaufman, Keith; *Preventing Campus Sexual Assault: Developing & Implementing a Sustainable Campus Situational Prevention Approach*; US Department of Justice; $1,000,000; **CLAS**
Mackiewicz, Marilyn; *In Vivo OCT Imaging of Transplanted Stem Cells Using Gold Nanorod Enhanced Contrast*; National Institutes of Health; $693,762; **CLAS**
Morse, Jennifer; *Documenting Improvements in Nitrous Oxide Emissions through Nitrogen Management on Agricultural Lands Within the Southern Willamette Valley Ground Water Management Area*; Natural Resources Conservation Service; $170,347; **CLAS**
Nicolaidis, Christina; **Raymaker, Dora**; *Advancing Methods for Authentic Patient and Stakeholder Engagement in Autism-Related Patient Centered Outcomes Research*; Patient-Centered Outcomes Research Institute; $1,060,001; **SSW**
Nygren, Peggy; **Rockhill, Anna**; *MIECHV Competitive Three (C3) Grant Evaluation*; HRSA Health Resources and Services Administration; $712,928; **SSW**
Orellana, E. Roberto; *Piloting an HIV and Drug Use Risk Reduction Intervention for Latin American Men*; National Institutes of Health; $639,284; **SSW**
Reder, Stephen; **Fountain, Robert**; *National Agricultural Workers' Study*; US Department of Labor; $112,787; **CLAS**
Rockhill, Anna; *New Pathways for Fathers and Families; Administration for Children and Families*; $600,000; **SSW**
Shinn, Craig; **Robinson, Kent**; **Allen, Jennifer**; *Portland State University Region 10 EPA Environmental Finance Center*; Environmental Protection Agency; $5,425,287; **CUPA**
Siderius, T. Martin; *Expendable Direct Sensing for AUV Based Geotechnical Survey Operations*; Office of Naval Research; $629,307; **MCECS**
Siderius, T. Martin; **Zurk, Lisa**; *POSYDON; Defense Advanced Research Projects Agency*; $879,737; **MCECS**
Walker, Janet; *National Training and Technical Assistance Center for Child, Youth and Family Mental Health*; Substance Abuse and Mental Health Services Administration; $1,570,221; **SSW**
Wallack, Lawrence; **Winett, Liana**; *Media analysis to Frame a Culture of Health*; Robert Wood Johnson Foundation; $997,529; **CUPA**
Wan, Eric; *Passive in-home Monitoring of Gait and Mobility*; Alzheimer's Association; $199,975; **MCECS**
Wells, Scott; **Sytsma, Mark**; **Strecker, Angela**; *Dexter Reservoir Water Quality Assessment and Evaluation*; US Army Corps of Engineers; $28,389; **MCECS**
Williams, Dilafruz; *Science in the Learning Gardens: Broadening Support for Racial and Ethnic Minority Students' Success in Science in Low-income Middle Schools*; Portland Public Schools; $55,370; **GSE**
Wortham-Galvin, B.D.; *A Place to Be: Affirming Portland's African American Heritage*; National Endowment for the Arts; $62,071; **COTA**
Xie, Fei; *CSR: Small: Hardware/Software Co-Monitoring*; National Science Foundation; $16,000; **MCECS**
Yatchmenoff, Diane; *Adverse Childhood Events and Trauma Collaborative Center (ACETCC)*; Oregon Health Authority; $1,347,000; **SSW**
Zaron, Edward; *Development of Barotropic and Baroclinic Tide Models in Support of SWOT Mission*; NASA Goddard Institute (NASA GISS); $266,192; **MCECS**

Expenditures by Quarter



Research Expenditures Q4, 2015



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Q4 Publications

View the complete list of publications at:
pdx.edu/research/university-research

Abbott, Carl (2015). *Community by Design: The Olmsted Form and the Development of Brookline, Massachusetts* by Keith N. Morgan, Elizabeth Hope Cushing, and Roger G. Reed (review). Technology and Culture 56(2), 544-545

Bilde, M.; **Barsanti, K.**; Booth, M.; et al (2015). Saturation vapor pressures and transition enthalpies of low-volatility organic molecules of atmospheric relevance: From dicarboxylic acids to complex mixtures. *Chemical Reviews*, 115(10), 4115-4156

Brown, L. D.; & **Townley, G.** (2015). Determinants of engagement in mental health consumer-run organizations. *Psychiatric Services*, 66(4), 411-417

Carnovale, S.; & Yeniyurt, S. (2015). The role of ego network structure in facilitating ego network innovations. *Journal of Supply Chain Management*, 51(2), 22-46

Cohen, S.M. (2015). Extended necessary condition for local operations and classical communication: Tight bound for all measurements. *Physical Review A*, 91(6), Article # 062125

Cohen, S. M. (2015). Structure of local quantum operations and classical communication: Finite versus infinite rounds. *Physical Review A*, 91(4), Article # 042106

Davidson, T. M.; & Grupe, B. M. (2015). Habitat modification in tidepools by bioeroding sea urchins and implications for fine-scale community structure. *Marine Ecology*, 36(2), 185-194

DeBenedetti, W. J.; **Chiu, S.-K.**; **Radlinger, C. M.**; **Ellison, R. J.**; **Manhat, B. A.**; Zhang, J. Z.; Shi, J.; & **Goforth, A. M.**; et al (2015). Conversion from red to blue photoluminescence in alcohol dispersions of alkyl-capped silicon nanoparticles: Insight into the origins of visible photoluminescence in colloidal nanocrystalline silicon. *The Journal of Physical Chemistry C*, 119(17), 9595-9608

View the complete list of publications at:
pdx.edu/research/university-research

Deur, D.; Dick, A.; Recalma-Clutesi, K.; & Turner, N. J. (2015). Kwakwaka'wakw "Clam Gardens." *Human Ecology*, 43(2), 201-212

Fang, Y.; Logan, J. R.; & Pal, A. (2015). Emerging socio-spatial pattern of Chinese cities: The case of Beijing in 2006. *Habitat International*, 47, 103-112

Friesen, B. J.; Cross, T. L.; **Jivanjee, P.**; Thirstrup, A.; **Bandurraga, A.**; **Gowen, L. K.**; & Rountree, J. (2015). Meeting the transition needs of urban American Indian/Alaska Native youth through culturally based services. *The Journal of Behavioral Health Services & Research*, 42(2), 191-205

Geenen, S.; **Powers, L. E.**; **Phillips, L. A.**; Nelson, M.; **McKenna, J.**; **Winges-Yanez, N.**; Croskey, A; Dalton, L.D.; Salazar, A.; & Swank, P. (2015). Better Futures: A randomized field test of a model for supporting young people in foster care with mental health challenges to participate in higher education. *The Journal of Behavioral Health Services & Research*, 42(2), 150-171

Goodling, E.; **Green, J.**; & **McClintock, N.** (2015). Uneven development of the sustainable city: shifting capital in Portland, Oregon. *Urban Geography*, 36(4), 504-527

Guerrant Jr, E. O.; Havens, K.; Vitt, P.; Fiedler, P. L.; Falk, D. A.; & Dixon, K. (2015). Population structure integral to seed collection guidelines: A response to Hoban and Schlarbaum (2014). *Biological Conservation*, 184, 465-466

Hakuna, L.; **Doughan, B.**; **Escobedo, J. O.**; & **Strongin, R. M.** (2015). A simple assay for glutathione in whole blood. *Analyst*, 140(10), 3339-3342

Huguet, N.; McFarland, B. H.; & Kaplan, M. S. (2015). A comparison of suicides and undetermined deaths by poisoning among women: an analysis of the National Violent Death Reporting System. *Archives of Suicide Research*, 19(2), 190-201

Kelly, M.; **Wilkinson, L.**; **Pisciotta, M.**; & Williams, L. S. (2015). When working hard is not enough for female and racial/ethnic minority apprentices in the highway trades. *Sociological Forum*, 30(2), 415-438

Lopezrevoredo, A. (2015). Women incarceration and human rights violations: Feminist criminology and corrections. *Affilia Journal of Women and Social Work*, 30(2), 274-275

Lutterschmidt, D. I.; Lucas, A. R. (2015). Trans-seasonal activation of brain GnRH: Mechanisms underlying temperature-induced reproduction. *Integrative and Comparative Biology*, 55, E115-E115

Marino, C. (2015). Hear me, see me: Incarcerated women write. *Affilia Journal of Women and Social Work*, 30(2), 271-272.

McGee, M. G. (2015). Peer victimization as a mediator of the relationship between disability status and psychosocial distress. *Disability and Health Journal*, 8(2), 250-257

Morse, J. L.; Durán, J.; & Groffman, P. M. (2015). Soil denitrification fluxes in a northern hardwood forest: The importance of snowmelt and implications for ecosystem N budgets. *Ecosystems*, 18(3), 520-532

Najafi, M. R.; & **Moradkhani, H.** (2015). Multi-model ensemble analysis of runoff extremes for climate change impact assessments. *Journal of Hydrology*, 525, 352-361

Nielsen-Pincus, M.; Ribe, R. G.; & Johnson, B. R. (2015). Spatially and socially segmenting private landowner motivations, properties, and management: A typology for the wildland urban interface. *Landscape and Urban Planning*, 137, 1-12

Orellana, E. R.; Goldbach, J.; Rountree, M. A.; & Bagwell, M. (2015). Access to mental health and substance abuse services by people living with HIV/AIDS: The case manager perspective. *Health & Social Work*, 40(2), e10-e14

Padigi, P.; **Thiebes, J.**; **Swan, M.**; **Goncher, G.**; **Evans, D.**; & **Solanki, R.** (2015). Prussian green: A high rate capacity cathode for potassium ion batteries. *Electrochimica Acta*, 166, 32-39

Pankow, J. F.; **Strongin, R. M.**; & **Peyton, D. H.** (2015). More on hidden formaldehyde in E-cigarette aerosols - reply. *New England Journal of Medicine*, 372(16), 1576-1577

Porter, W. C.; **Rosenstiel, T. N.**; Guenther, A.; Lamarque, J. F.; & **Barsanti, K.** (2015). Reducing the negative human-health impacts of bioenergy crop emissions through region-specific crop selection. *Environmental Research Letters*, 10(5), Article # 054004

Smyth, J. V. (2015). Deception, Concealment, Discretion: Forms of the Modern Sacred and Profane. *Parallax*, 21(2), 166-182

Truitt, A. M.; **Granek, E. F.**; Duveneck, M. J.; **Goldsmith, K. A.**; **Jordan, M. P.**; & **Yazzie, K. C.** (2015). What is novel about novel ecosystems: Managing change in an ever-changing world. *Environmental Management*, 55(6), 1217-1226

Walker, J. S.; **Brennan, E. M.**; **Jivanjee, P.**; **Koroloff, N.**; & **Moser, C. L.** (2015). Introduction to the special issue: Empirically-based interventions for emerging adults with serious mental health conditions. *The Journal of Behavioral Health Services & Research*, 42(2), 127-130

Walker, J. S.; **Koroloff, N.**; & **Mehess, S. J.** (2015). Community and state systems change associated with the Healthy Transitions Initiative. *The Journal of Behavioral Health Services & Research*, 42(2), 254-271

Doctoral Degrees Conferred, Spring 2015

Peter Banda, Ph.D.
Dissertation Chair: **Christof Teuscher - MCECS**
Dissertation title: *Novel Methods for Learning and Adaptation in Chemical Reaction Networks*

Steven Matthew Braun, Ph.D.
Dissertation Chair: **Marion Dresner - CLAS**
Dissertation title: *Localized Ecological and Educational Effects of Environmental Service-Learning in Portland, Oregon*

Melissa Lynn Cannon, Ph.D.
Dissertation Chair: **Sy Adler - CUPA**
Dissertation title: *Challenges, Experiences, and Future Directions of Senior Centers Serving the Portland Metropolitan Area*

David Ellis Caughlin, Ph.D.
Dissertation Chair: **Leslie Hammer - CLAS**
Dissertation title: *Dynamic Job Satisfaction Shifts: Implications for Manager Behavior and Crossover to Employees*

Yu-Hsuan Chu, Ph.D.
Dissertation Chair: **Robert Strongin - CLAS**
Dissertation title: *Custom Fluorophores for Investigating the Cellular Uptake Mechanisms and Side-Effects of Pharmaceuticals*

Kai Cong, Ph.D.
Dissertation Chair: **Fei Xie - MCECS**
Dissertation title: *Post-silicon Functional Validation with Virtual Prototypes*

Tori Laurelle Crain, Ph.D.
Dissertation Chair: **Leslie Hammer - CLAS**
Dissertation title: *Investigating Relationships among Work, Family, and Sleep: Cross-Sectional, Daily, and Intervention Effects*

Caitlin Ann Demsky, Ph.D.
Dissertation Chair: **Charlotte Fritz - CLAS**
Dissertation title: *Workplace Aggression: A Multi-Study Examination of Work and Nonwork Consequences*

Allison Marie Ellis, Ph.D.
Dissertation Chair: **Charlotte Fritz - CLAS**
Dissertation title: *Building Resources at Home and at Work: Day-Level Relationships between Job Crafting, Recovery Experiences, and Work Engagement*

Jodi I. Fasteen, Ph.D.
Dissertation Chair: **Eva Thanheiser - CLAS**
Dissertation title: *An Investigation of the Role of Alternate Numeration Systems in Preservice Teacher Mathematics Content Courses*

James Campbell Gladish, Ph.D.
Dissertation Chair: **Donald Duncan - MCECS**
Dissertation title: *Revealing Structural Organization with Liquid Crystal-based Spectral Imaging Polarimetry*

Lisa J. Hatfield, Ed.D.
Dissertation Chair: **Karen Haley - GSE**
Dissertation title: *The Scholarship of Student Affairs Professionals: Effective Writing Strategies and Scholarly Identity Formation Explored through a Coaching Model*

Rana Houshmand, Ed.D.
Dissertation Chair: **Susan Lenski - GSE**
Dissertation title: U*sing Socratic Questioning as an Instructional Tool to Help High School Students at Grade Twelve Improve Their Perceptions of the Writing Process*

Jacklyn Nicole Kohon, Ph.D.
Dissertation Chair: **Paula Carder - CUPA**
Dissertation title: *Building Social Sustainability from the Ground Up: The Contested Social Dimension of Sustainability in Neighborhood-Scale Urban Regeneration in Portland, Copenhagen, and Nagoya*

Sung Moon Kwon, Ph.D.
Dissertation Chair: **James Strathman - CUPA**
Dissertation title: *The Effects of Urban Containment Policies on Commuting Patterns*

A.J. Lawrence, Ph.D.
Dissertation Chair: **Erik Sanchez - CLAS**
Dissertation title: *Modeling the Optical Response to a Near-Field Probe Tip from a Generalized Multilayer Thin Film*

Doctoral Degrees Conferred, Spring 2015

Li Lei, Ph.D.
Dissertation Chair: **Fei Xie - MCECS**
Dissertation title: *Hardware/Software Interface Assurance with Conformance Checking*

Lakindra Michelle Mitchell Dove, Ph.D.
Dissertation Chair: **Laurie Powers - SSW**
Dissertation title: *Got Hair that Flows in the Wind: The Complexity of Hair and Identity among African American Female Adolescents in Foster Care*

Andrew Demetrius Palmer, Ph.D.
Dissertation Chair: **Jason Newsom - CUPA**
Dissertation title: T*he Impact of Communication Impairments on the Social Relationships of Older Adults*

Jennifer Rose Pitzer, Ph.D.
Dissertation Chair: **Ellen Skinner - CLAS**
Dissertation title: *Exploring the Developmental Dynamics of Motivational Resilience Over the Transition to Middle School*

Clair Elizabeth Pople, Ed.D.
Dissertation Chair: **Jason Ranker - GSE**
Dissertation title: *Gifted Black and Biracial Students at a Predominantly White Gifted School*

Anthony John Santoriello, Ph.D.
Dissertation Chair: **Wayne Wakeland - CLAS**
Dissertation title: *Assessing Unique Core Values with the Competing Values Framework: The CCVI Technique for Guiding Organizational Culture Change*

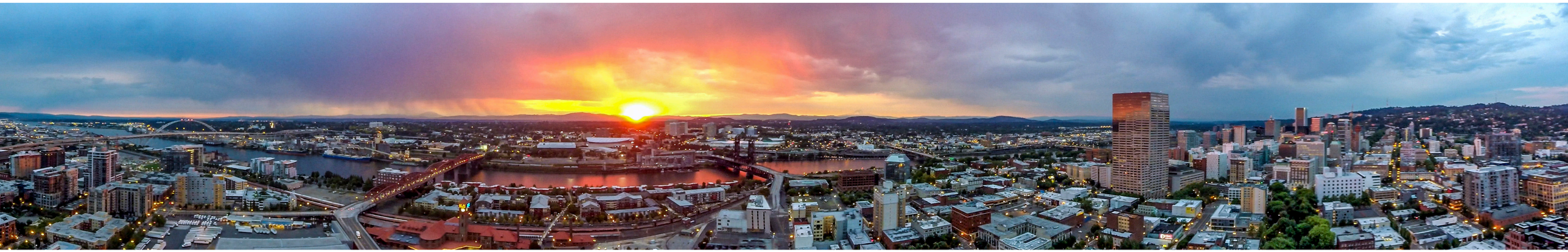
Randall William Smith, Ph.D.
Dissertation Chair: **Erik Sanchez - CLAS**
Dissertation title: I*nvestigations of the Air-Water Interface: A Structural Analysis of Metallic Surface Films and Aquatic Surface Films by Comparative Microscopy*

Aisha Smith Taylor, Ph.D.
Dissertation Chair: **Keith James - CLAS**
Dissertation title: *Transformational Leadership, Diversity, and Creativity at Work: A Moderated Mediation Model*

Linh Hoang Tran, Ph.D.
Dissertation Chair: **Marek Perkowski - MCECS**
Dissertation title: *Reversible Circuits Synthesis Based on EXOR-sum of Products of EXOR-sums*

Donna Louise Webb, Ed.D.
Dissertation Chair: **Dannelle Stevens - GSE**
Dissertation title: *Engineering Professional Development: Elementary Teachers' Self-efficacy and Sources of Self-efficacy*

Research & Strategic Partnerships
Quarterly Review, Volume II, Issue 4, 2015



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